Claims

1. A method for storing two-dimensional spatially organized data in one-dimensional space on a computer storage medium by mapping the attributes of continuous state planar space to a multi-resolutional tessellation of close-packed uniform cells, each cell being uniquely identified with a sequential number whereas the number includes the identification of a parent cell, the parent cell encompassing a cluster of child cells in a spatial hierarchy of specific order thereby identification of neighbour cells and child cells comprising the requirements:

    1. spatial attributes are assigned to a parent cell, whose centroid represents its location and the voronoi region created by the boundary with adjacent parent centroids forming the closed area for which the properties of the cell are represented;

    2. a parent cell for which the centroid location is not a centroid location for any lower resolution cells defines the location of a single new child cell of the next highest resolution; alternatively,

    3. a parent cell for which its centroid location is also a centroid location for any lower resolution cells defines the location of a single new child cell of the next highest resolution and multiple new child cells of the next highest resolution, one located at each of the vertices of the parent's boundary edge.

    whereby during initial conditions, a parent cell will be assigned a general hexagon shape or the shape of the plane for which it represents, with a starting centroid location that can be considered the planar origin.

2. A method according to claim 1 wherein the numbers at each resolution are clustered by parent and ordered according to a simple sequence or selected from the group: the z-curve, Generalized Balanced Ternary, Gray coding, and hybridized Gray GBT ordering.

3. A method according to claim 1 or 2 wherein the cell shapes and sections of cells on the plane can be modified by including or excluding, bending, joining, stretching, rotating, scaling and translation.

4. A method according to one of the preceding claims wherein the hierarchal indexing can be modified by adding or deleting levels or introducing new unique index values.

5. A method according to one of the preceding claims wherein a cell may be introduced at any unique location and specific resolution whereas its ordering precedence superceding its neighbours and its behaviors are considered as a parent cell for which its centroid location is also a centroid location for lower resolution cells.

6. A method according to one of the preceding claims wherein two or more cells may be introduced at any unique locations and specific resolution and wherein the boundary of two or three of the new cells share vertices, such vertices define the location of new child cells and the child cells shall be uniquely indexed with reference to its three shared parents, and the behavior of these child cells are considered as a parent cell for which their centroid location is not a centroid location for any lower resolution cells.

7. A discrete global grid system wherein spatially organized data, as a multi-resolutional tessellation of close-packed uniform cells, is stored as a one-dimensional georeference having had each two-dimensional cell projected from the faces of a platonic solid to a geodesic spheroid, each spatial cell being uniquely identified with a sequential number, especially according to a method of one of the preceding claims whereas the number includes the identification of a parent cell, the parent cell encompassing a cluster of child cells in a spatial hierarchy of specific order thereby identification of neighbour cells and child cells.

8. A system according to claim 7 wherein the numbers at each resolution are clustered by parent and ordered according to a simple sequence or selected from the group: the z-curve, Generalized Balanced Ternary, Gray coding, and hybridized Gray GBT ordering.

9. A system according to claim 7 or 8 wherein the cell shapes and sections of cells on the plane can be modified by including or excluding, bending, joining, stretching, rotating, scaling and translation.

10. A system according to one of the claims 7 to 9 wherein the hierarchal indexing can be modified by adding or deleting levels or introducing new unique index values.

11. A system according to one of the claims 7 to 10 wherein a cell may be introduced at any unique location and specific resolution whereas its ordering precedence superceding its neighbours and its behaviors are considered as a parent cell for which its centroid location is also a centroid location for lower resolution cells.

12. A system according to one of the claims 7 to 11 wherein two or more cells may be introduced at any unique locations and specific resolution and wherein the boundary of two or three of the new cells share vertices, such vertices define the location of new child cells and the child cells shall be uniquely indexed with reference to its three shared parents, and the behavior of these child cells are considered as a parent cell for which their centroid location is not a centroid location for any lower resolution cells.

13. A system according to claim 12 where the shape, orientation and projection conforms to the Icosahedron Snyder Equal Area Aperture 3 Hexagon Grid and the division of the icosahedron surface begins with the introduction of 12 points, one on each icosahedron vertex, resulting in pentagonal shaped voronoi regions with shared cell vertices located at the center of the icosahedron faces, further defining 20 second generation hexagonal cells at each of these shared vertices and 12 second generation pentagonal cells each at the icosahedron's vertices.

14. A system according to one of the claims 7 to 13 wherein the system includes software instructions that mathematically convert, georeference and integrate spatial data, raster images, topological georeferenced vectors to a gridded close-packed cell reference for storage in a database or digital file.

15. A system according to one of the claims 7 to 14 wherein the system includes instructions which returns to a computer visualization device a representation of the spatially organized data associated with a spatial area and range of resolutions in the form of a whole or partial rendered image of the geodesic globe.

16. A system according to one of the claims 7 to 15 wherein the system includes instructions that allow data referenced to the close-packed cell grid to be advertised, shared and transmitted over a network in anyone of: a complete file transfer, a progressively transmitted transfer and a continuous state up dateable transfer.

17. A system according to one of the claims 7 to 16 wherein the system includes instructions that identify on-line data referenced to a cell location as a result of a search query, displaying at an automated or manually set resolution, a pictographic symbol at the cell location on the image of the globe which further instructions provide a means to select this symbol with a cursor, activating further software instructions.

18. A system according to one of the claims 7 to 17 wherein the overlapping gridded data structure provides a framework for selecting and extracting data and completion of mathematical routines for spatial integration, analysis and fusion.

19. A system according to one of the claims 16 to 18, further allowing the spatial addressing and ordering to be used as a mesh or grid for the construction of stochastic and deterministic simulation of dynamic earth events whereas the system is arranged such

that users can access on-demand in a peer-to-peer environment a multitude of temporal geospatial data at each cell and arranged such that this spatial data can be extracted and utilized in custom defined storage, routing and transformation routines and formulation.

20. A system according to claim 19 whereas the transformation routines include finite difference methods.

21. A system according to claim 19 or 20 whereas the transformations routines include cellular automata.